

Casts and Molds

Knowing how to make casts and molds can help you protect evidence. The impression of a footprint at a crime scene might be evidence linking a suspect to that scene. But to learn if an imprint is evidence, it must be examined and compared with other evidence. And to be useful evidence, it must be able to be retained for submission, if needed, in court. Impressions of most footprints, tire prints, and the like are fragile. Their evidence value can be destroyed by time, the elements, or the process of being collected. They must be preserved in their original state to be useful. This is done by making casts and molds.

Casts and molds of imprints can be used for field comparisons. And, more importantly, they can be sent to the crime lab to be examined. Lab specialists will look for signs of class marks and individual marks that may have been on the item making the imprint. Class marks are marks or lettering made by a manufacturing process.

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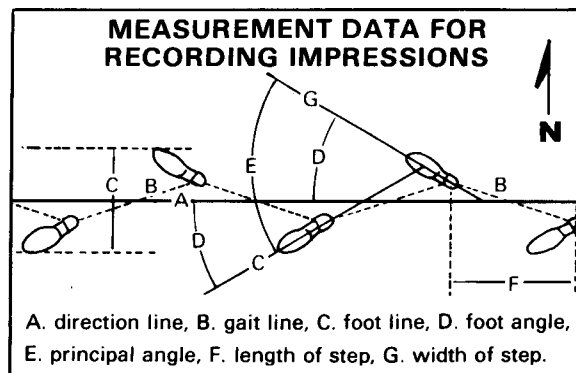
Individual marks are marks unique to an item. They are made by the cuts, tears, and uneven wear of daily use. It is the presence of these marks that will allow the examiner to make a positive or negative identification.

RECORDING IMPRESSIONS

STEP 1 The first step in recording an imprint is to protect it from destruction. This may mean covering it with an object like a trash can lid or cardboard box if it is small. In a large area, this may mean roping off the area and having guards posted. The imprint must also be protected from on-the-scene comparisons. *Comparisons must be done only by the lab.* For example, when a suspect's shoe is found before a cast is made of the imprint, it is human to want to compare them. But if anyone places the shoe in the print, he may contaminate the print. This could make an identification invalid in court.

STEP 2 After protecting the imprint, it must be photographed. First, make an area photograph. This places the print in relation to other objects. Then, take a closeup of the print. All prints should be photographed with a ruler in place before developing or lifting the print.

STEP 3 Make sure the location of the imprint is shown in the crime scene sketch. Measurements, too, should be included. And show details like trademarks, nail holes, cuts, and scars in the sketch. Then make sure the measurements and other data are in your notes. Now you are ready to make a cast of the impression.



PREPARING IMPRESSIONS

To obtain a good cast it is often necessary to prepare the imprint. If a print is found outdoors, check to see if any particles have blown into it. These should be removed carefully. Use a syringe to blow away dust that has gathered. Use a pair of tweezers or a pocket knife to take out small stones. A syringe also can be used to withdraw water from the imprint. Or water can be drained by cutting a small channel at one side of the print. Be careful to not destroy parts of the print.

Make a practice cast of your own shoe print before trying to make the evidence cast. Check it to see if the soil is cohesive enough to have made a good print. In sandy and loamy soils the particles may lack cohesion, making the print fragile. If so, the print should be strengthened to support the weight of the casting material. This will keep fine detail from being destroyed. You can strengthen the print by spraying it with a plastic spray or lacquer. Hair spray and paint spray also may be used. Spraying directly on the print may damage details. Instead, direct the spray against cardboard or other material. This

will cause a fine mist to settle gently into the print. Let dry, then spray again. The number of coats you will need can be determined by examining the test print. Three to ten coats in sandy soil is often enough. When the strengthening spray has dried, spray a mist of light oil or silicone on the print. The oil will make it easier to remove the cast.

Sprays are used to make a print solid; they are not always needed in the process. If a print is in solid, earthy material, strengthening preparation is not necessary. Likewise, if a print is found indoors in dust, no preparation may be required. Instead, use the method for preparing fingerprint impressions.

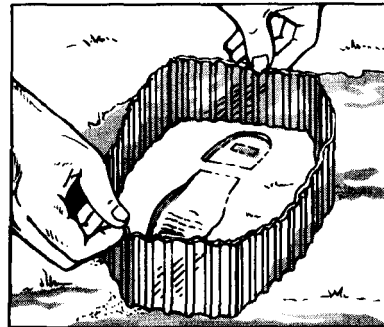
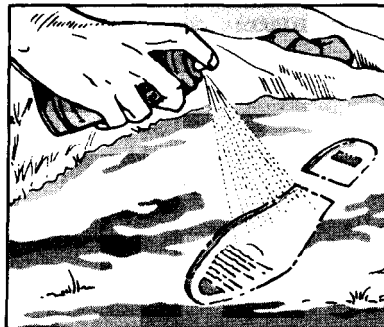
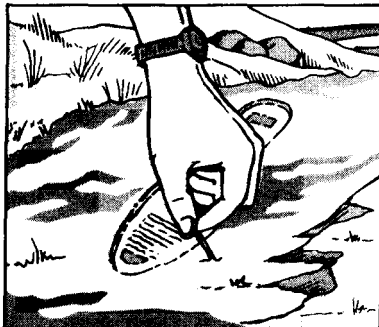
When you are ready to cast, place a retaining wall around the print. This confines the casting mixture. And it allows the cast to be built to the desired thickness. The wall may be made of earth or other material. Old venetian blind slats make good retaining walls. If you make a permanent wall, one you can reuse, give it a coat of oil. This will let it be removed from the cast with ease.

CHOOSING YOUR MATERIAL

Dental stone takes good impressions of foot and tire prints. Plaster of paris and dental compound also can be used. These materials are most useful for imprints in dirt, mud, sand, or snow that do not show fine detail. When microscopic detail is needed, something other than these must be used. Liquid sulphur gives very fine details. But it is not as readily available as dental stone or

dental compound. Dental stone and dental compound are available through supply channels or post health facilities.

Latex rubber can be used to reproduce faint prints on linoleum and fingerprints developed with powder. However, the prints on the latex have been known to fade. Silicone rubber can be used to cast



Remove loose debris; spray to stabilize loose dirt, then surround with a form to confine and build up the mixture.

fingerprints found in putty and caulking around window panes. Silicone rubber is more expensive than plaster or compound. But casts can be made more quickly with silicone. Water or heat is not needed. The casts are flexible, which keeps them from breaking during handling or shipping. And the silicone freezes at very low temperature, which makes it useful in casting prints in the snow. Epoxy casting resin may be used to make a "positive" from the silicone rubber impression.

CASTING WITH PLASTER, DENTAL STONE, OR DENTAL COMPOUND

When casting in plaster, dental stone, or dental compound, it is best to use a thin mixture in the print at first. This helps to record the finest detail. Follow this with a thicker mixture. But if the first mixture is too thin, it may wash away details. Testing will show the right proportions.

A thin mixture records more detail than a thick mixture. But it also needs a longer time to set. The mixture will set faster if salt is added to the water. One-half teaspoon of salt should be added to each pint of water. The more salt, the faster the setting. Sugar added to the water will slow the setting. One part of borax to ten parts of water will slow the setting from 15 to 30 minutes. It also makes the cast harder and clearer. These substances should be added to the water before the plaster or dental compound is added.

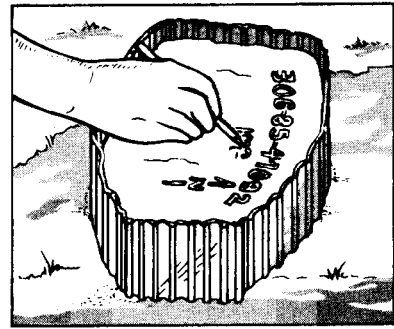
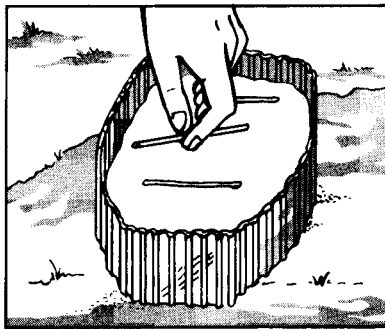
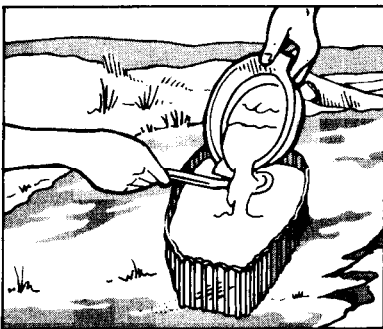
Two ways to prepare the mixture may be used. Both ways require you to sift the powder into water. Never add the water to the powder. One way is to sift the powder slowly into the water while stirring. The second way

is to sift the powder around the edges of a water-filled container. Powder is added until it begins to rise to the surface. When cracks appear, no more powder should be added. Mix by stirring under the top to a thick, creamy consistency. Remove any lumps.

Pour the mixture into the print. Pour it from a low level. Break the force of the falling mixture by using a spatula or your hand. Pour the mixture into the print at a place where there is little detail.

After one-half to three-fourths inches of mixture has been poured, add reinforcing material. Sticks or wire are good to use. But care must be taken to keep the ends from sticking through the bottom of the cast. Soak twigs or wood in water before use. Dry twigs or wood will soak up water from the cast, making it fragile. Lay the twigs, sticks, or pieces of wire at random in the cast. Do not lay them parallel. If they are laid in only one direction, the cast may fracture between the pieces. Or you can use wire mesh to prevent this problem. After the reinforcement is put into the cast, more mixture can be added until the desired thickness of the cast is reached. When using dental stone, no reinforcing material is needed. And casts need be only one to two inches thick. Dental stone is three to four times as strong as plaster. The addition of reinforcing material could cause the stone to crack.

The mixture hardens about 25 minutes after preparation. While setting, it becomes warm. When it starts to cool, the cast is hard enough to remove for processing. Care must be taken in its removal. The cast is still fragile, even when it is reinforced. Allow the cast to dry 36 to 48 hours before sending it to the lab.



Pour plaster over a spatula; add reinforcement, followed by more plaster; then mark cast with ID and arrow pointing North.

Casting Under Water

It may be necessary to cast a footprint or tire print that is under too much water to drain or to remove. A section of stovepipe may be used to direct the dry powder to the print. This prevents waste of the powder. The powder should be sifted into the print through the stovepipe. This can even be used in deep water. Salt may be added to the mixture to speed the setting time. Three to four parts salt to ten to twelve parts dry mixture is a good mix.

Casting in Snow

Because dental stone, plaster of paris, and dental compound give off heat as they harden, their mixtures, when casting in snow, have a tendency to melt the snow. This can destroy the print or damage the print's details. Thus the temperature, depth, sticking quality of the snow, and the condition of the ground surface must be carefully considered. You should make test casts in the snow away from the print. This will help you decide how to proceed.

The print may be strengthened with plastic spray. Then, a thin layer of talcum powder can be put in the print with a syringe. The talcum acts as insulation against the heat. The print should be sprayed again. Several coats of spray may be necessary to fix the print. Use a retaining wall to keep the mixture from spreading to areas which are not insulated.

CASTING WITH SILICONE

Silicone can be used for foot and tire prints, dust prints, tool marks, casting of parts of the human body, and fingerprints. Silicone

rubber is not recommended for surfaces with natural patterns like leather or fabric. The detail of the print is hidden by the detail of the natural surface.

Silicone rubber is a fast setting rubber. It sets up in a firm rubbery mass. The catalyst that causes it to set comes in a small tube with the package. The catalyst should be totally mixed with the liquid rubber just before using. Stir and pour the mix smoothly to avoid air bubbles that may cover details in the cast.

Setting time of the rubber can be changed by adding more or less catalyst. About one-half teaspoon of catalyst to a pound of the rubber is usually needed. Instructions are sent with the material. When catalyzed, the rubber will remain workable for about 5 minutes at 77° Fahrenheit. Lower temperatures lengthen setting time. A setting time of 5 to 10 minutes for prints in dust is recommended.

CASTING WITH LIQUID SULPHUR

When casting with liquid sulphur, add one part iron filings to eight parts melted sulphur. Let the mixture cool. When you use liquid sulphur, the retaining wall must have a light coat of oil. The object bearing the impression should be lightly oiled, too. While the sulphur is still liquid, pour it over the object to be cast. The sulphur can be blown into the smallest of indentations.

Sulphur is useful for casting in snow. You can take it to the scene in a thermos bottle. The liquid sulphur crystallizes on contact and gives excellent detail.

CASTING DIFFICULT IMPRESSIONS

Some impressions present special problems for casting. Tool marks can be changed or destroyed in attempting to make casts of them. And tire imprints require more extensive casts than other imprints.

TOOL MARKS

Avoid making casts of tool marks when possible. Original tool mark evidence is more useful for scientific examination. It is less subject to attack in court than casts. And

often you are not able to make casts or photographs that show enough evidence. This makes identification hard at the lab.

When you must make a cast of a tool mark, use the material best suited for the shape and type of mark to be reproduced. Flat tool marks like hammer, chisel, and pry marks may be reproduced with a variety of materials. Tool marks in wood, where undercuts are present, will have to be reproduced with a flexible material.

Do not try casting or molding a tool mark until you have practiced on a similar wooden or metallic surface of no value. Take enough care and time to get a usable reproduction. Keep the surface bearing the tool mark as original evidence until you have an accurate reproduction. Then clear its release with proper legal authorities.

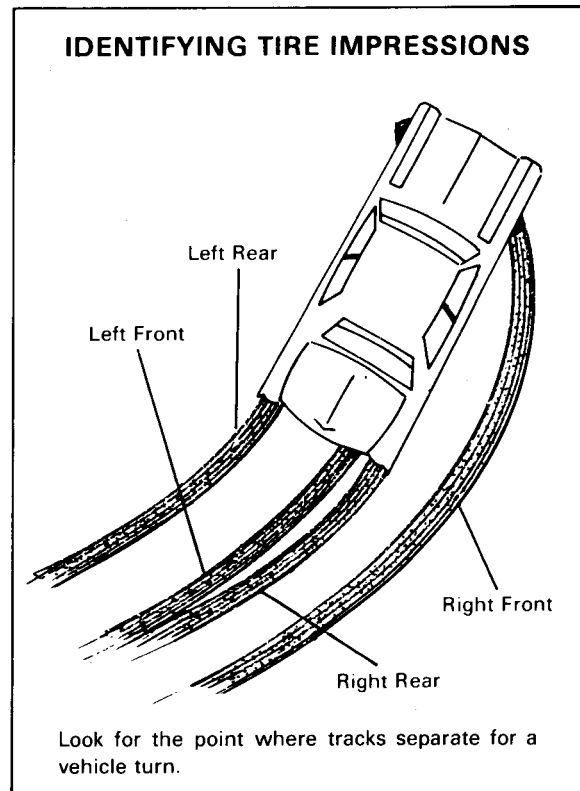
An imprint found on wood or on a metallic surface may be cast with modeling clay or plasticize. These materials do not take any special preparation before use. They are not likely to damage a tool mark if the first casting try does not work. A reproduction of the tool mark itself may be made from this cast using plaster or dental stone or compound. Usually, you need not reproduce a mark on a wood surface because the original evidence can be easily removed and retained.

TIRE IMPRESSIONS

Casts should be made of the entire circumference of the tire involved. The circumference of a tire is usually between 5 and 8 feet. The likelihood of matching a track with a certain tire increases with the length of the cast made.

Casts should be made of each track found. Testimony that the combination of the designs taken from a set of four tire impressions found at the crime scene corresponds to the designs and the wheel positions of the four tires on the suspect's automobile is of obvious value.

Suspect tires should be sent to the lab with the casts. Leave the rims on the tires and keep them inflated. The lab may need to make test prints with the tires. Each cast and tire sent should be identified as to the wheel position. Sketches, photographs, and other notes should also identify wheel position.



COMPLETING THE CAST

Whatever your material, after you have made the cast and before it is set, you must mark it for identification. The data can be scratched into the surface of the cast. Any instrument may be used. The minimum data should be the case number, date, and your initials. An arrow showing north will help locate the exact placement of the cast in relation to other evidence.

Sometimes several casts are made at the same location. These casts should be numbered consecutively. The number and place of each cast should be entered in your notebook. You may want to take casts of several shoe and tire prints found at the

scene. This can help the lab specialists with their examinations. One print made by a shoe can give details not found in a second print made by the same shoe.

After you have removed the cast from the print you may gently remove excess dirt by hand. Do not use a brush or water under pressure. It may damage details. If you collect parts of the soil in the area near the print for testing with soil on the shoes or clothing of a suspect, do not wash the cast. The clinging soil will provide the lab with samples of the soil directly under the shoes of the suspect when he made his imprint. It may aid the examiners in comparing the soils.

PACKAGING

Casts must be carefully packaged to send to the lab. A cast is fragile evidence. It is easily abraded. It must be handled carefully. The cast should be wrapped in soft paper or cotton. This may keep fine identification points from being destroyed. It should then be wrapped in strong wrapping paper and

placed in a box. Cushion the cast on all sides with shock absorbing material. Wax and modeling clay casts are not as fragile as other casts. But they can be deformed by pressure. These casts must be protected from pressure as well as abrasive action.

MOLDING

Sometimes you may need copies of a cast. Having a cast can help in your search for the item that made the original print. To obtain copies of a cast you make a mold from the original cast. Once a mold is made of the cast, as many copies as needed can be made.

The way you make a mold is almost the same way you make a cast. Pour your mixture into a container. A rubber photochemical

tray makes a good container. Give the cast a thin coat of light oil. Without the oil it may be impossible to remove the mold from the cast. Place the cast in the molding mixture. When the mixture is set, remove the cast. This leaves a mold that may be used for making other casts. The inside of the mold must be coated with oil before each duplicate cast is made.
